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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/829,463	04/09/2001	Riaz Esmailzadeh	34645-00499USPT	8691

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EXAMINER	
MERED, HABTE	
ART UNIT	PAPER NUMBER
2662	

DATE MAILED: 11/03/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/829,463	ESMAILZADEH ET AL.	
	Examiner	Art Unit	
	Habte Mered	2662	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-24 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-24 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 09 April 2001 is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 08/01/01,01/16/02.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Detailed Action

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims **1-5, 11-18 and 24** are rejected under 35 U.S.C. 102(e) as being anticipated by Kinnunen et al (US 6,707, 859) here after Kinnunen.

Regarding **claims 1 and 14**, Kinnunen teaches in general data reception methods for any receiver in a wireless data transmission system. In Figure 6, block 630 shows the essential components of a radio receiver in a CDMA system. *See column 7 lines 7-9.*

Referring to Kinnunen's Figure 6, blocks 636, 638, 640, 642 and 644 can be considered as a single user detection unit. The output of column 644 is the control part of the received data. *See Column 7 lines 29-36.*

Blocks 646, 648, 652, 654, 656, and 658 in Kinnunen's Figure 6 can be considered as a data detection unit. The outputs of blocks 656 and 658 are data signals. *See Column 7 line 61.*

Kinnunen in Figure 4 shows the structure of a typical signal frame received by a CDMA receiver. It clearly shows that the received signal has two components – control and data part. Kinnunen further discloses that the signal on the uplink has the data and control part IQ-code multiplexed. *See Column 5 line 44.*

Kinnunen further shows how the different data services or parts of the received frame are detected and decomposed using control information passed from the single user detector of the receiver. Kinnunen further shows that the control part is further processed in block 642 and decomposed further and forwarded to different parts of the receiver. For instance, block 644 of the single user detector decodes the TFI and forwards it to block 648 where block 648 of the data detection unit uses the forwarded TFI information from the control part to separate the different data services as discussed in *column 7 lines 53 - 65.*

Regarding **claims 2 and 15** Kinnunen shows that the received signal is decomposed into control and data part using a demultiplexer. See Figure 6 block 640 and *Column 7 lines 29 – 30.*

Regarding **claims 3 and 16** Kinnunen teaches that the received signal in the uplink is IQ (I= In Phase and Q=Quadrature) code multiplexed and QPSK modulated. See *Column 5 lines 43 to 47.* Figure 6, block 640 shows a demultiplexer where the input to the demultiplexer is the received signal. Since it has already been established that the received signal is In-phase/Quadrature code multiplexed then the demultiplexer (block 640) in Figure 6 has to be an In-phase/Quadrature demultiplexer.

Regarding **claims 4 and 17** Kinnunen discloses that the received signal contains a dedicated physical control channel (DPCCH) and the method of retrieving the information in the individual control channel. See *Column 7 lines 29 to 31.*

Regarding **claims 11 - 13, and 24** Kinnunen in Figure 6 shows a means of detecting data. The data detection unit in figure 6 comprising of blocks 636, 638, 640, 642 and 644 can be replaced with a single-user detection unit or a multi-user detection unit or a multi-stage multi-user detection unit without deviating from the concepts of the invention. See *Column 8 Lines 6 to 11.*

Regarding **claims 5 and 18** Kinnunen discloses that the received signal contains a dedicated physical data channel (DPDCH) and the method of retrieving the individual data channels. See *Column 7 lines 29 – 31.*

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims **6, 7 and 19** are rejected under 35 U.S.C. 103(a) as being unpatentable over Kinnunen as applied to claims 1 and 14 above, and further in view of Heikkila (US 6,771,690).

Regarding **claims 6, 7 and 19** Kinnunen discloses how a signal received by a CDMA receiver has a control and data part. Kinnunen also discloses how a receiver can determine the data part of a received signal frame using some part of the control

information obtained from the control part of the received signal frame. Kinnunen further discloses the radio receiver can be a CDMA receiver or a RAKE receiver and as shown in Figure 6 has all the essential components of a radio receiver of which some of these essential radio receiver components when viewed as a group can be presented as a single user detector. See *Column 7 lines 7-9, 29-36, and 55-66.*

However, Kinnunen's teaching does not use adaptive filter in any of the receivers it presented for discussion. Instead it uses an RF filter and dispreading technique to minimize interference.

Heikkila discloses a method of using an adaptive algorithm in a linear filter to minimize the mean square error of the estimate of unknown parameters such as transmitted data of other unknown users. Heikkila discloses the performance of an adaptive WCDMA terminal is better than a simple RAKE receiver in minimizing interference. Heikkila further discloses that a combination of an adaptive filter and a RAKE receiver results in an optimal receiver referred to as an adaptive LMMSE receiver. Heikkila shows in Figure 4 an LMMSE receiver comprising an adaptive filter (block 22) and a RAKE receiver (blocks 24 and 28) and that the optimal adaptive LMMSE receiver minimizes SIR. It is clear from Heikkila's teaching that the adaptive filter can block interference from other users and allow detection of a single user. See *Column 2 lines 28 – 60, Column 3 lines 14 – 22, Column 9 lines 35 – 40, and Column 9 lines 55 – 60.*

Also like Kinnunen, Heikkila too shows that the control information comprises channel estimates in the form of data symbols and is used to determine the data portion of the received signal frame. See *Column 11 lines 32 – 35.*

It would have been obvious to one having an ordinary skill in the art at the time the invention was made to modify Heikkila's adaptive filter configuration such that a means to detect the control part of the noise-minimized received signal of the single user is added. In this case it could be as simple as adding a demultiplexer. The motivation is a desire to have an efficient and quick means of accessing the vital information (pilot signal, power control bits (TPC), transport format indicator (TFI)) contained in the control part that can be used by the receiver as an entity for various purposes such as determining power requirement for down link, data rate of different services, etc...

Claim 8 - 10, 20 - 22, and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over as Kinnunen applied to claims 1 and 14 above, and further in view of Shoji (US 6,067,293).

Regarding claims 8 - 10, 20 - 22 and 23 Kinnunen shows a receiver in a CDMA system in general and a RAKE receiver in particular receives signal frames where each signal frame contains data and control part. Further Kinnunen discloses that assuming the spreading code of users are orthogonal, then an individual user signal is obtained by multiplying the received signal with the spreading code of the specific user signal already known to the receiver. See *Column 7 lines 7-9, 25-26, 29-36, and 55-66.*

However, Kinnunen does not disclose the case when the spreading codes of users are not orthogonal. The fact that the codes are not orthogonal makes the unwanted signals of the other users contribute to the noise level and effectively minimize the Signal to Interference Ratio (SIR).

Shoji discloses how to maximize RAKE synthesis in a RAKE receiver. Shoji shows that the RAKE synthesis is maximized when all the RAKE fingers are used efficiently at the appropriate time. Shoji further establishes the criteria of when to use the RAKE fingers in the receiver as a function of SIR and self-correlation value of the initial spreading code generated by the spreading code generator. Shoji shows that in Figure 2 the self-correlation value of the initial generated spreading code is calculated in the self-correlation (block 110) by manipulating the spreading code generated by the spreading code generated (block 109) there by in effect generating a new spreading code. Shoji further shows how the combination of the SIR and self-correlation values make the upper and lower threshold values by which the comparator circuits (blocks 111a, b, c) in Figure 2 determine the value of the weighting coefficient circuits (blocks 105a, b, c) in such a way that the RAKE fingers outputs are either on or off. Shoji has established that SIR measurement and a modified form of a replica of a spreading code used on the side of the transmitter to be quality factors in interference reduction in CDMA. See *Column 5 lines 1-35.*

It would have been obvious to combine Kinnunen's and Shoji teachings in such a way that SIR measurement is maximized so as to minimize the multi-access interference caused by the non-orthogonality of the spreading codes. It is a known fact to one

having an ordinary skill in the art if the spreading code of the detected user signal is manipulated enough to approach orthogonality with the spreading codes of the other unwanted signals then the SIR will be maximized. The manipulation of the code can be done using any well-known algorithms in the art including adoptive so long as the SIR is maximized. The motivation is a desire to increase WCDMA system capacity. The upper limit for the number of users that can utilize a CDMA system will dramatically increase if multi-access interference can be eliminated or significantly minimized.

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The following patents are cited to show the state of the art with respect to Multi-Access Interference, CDMA Receivers, Spreading sequence, and SIR measurement:

US Patent (6,782, 041) to Aihara

US Patent (6, 069, 912) to Sawahashi et al

US Patent (6, 473, 451) to Seki et al

US Patent (6, 647, 022) to Mailaender

US Patent (6, 771, 690) to Heikkila

US Patent (6, 192, 067) to Toda et al

US Patent (6, 088, 383) to Suzuki et al

US Patent (6, 529, 545) to Tirola et al

IEEE article to O'Farrell

IEEE article to Aghvami

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Habte Mered whose telephone number is 571 272 6046. The examiner can normally be reached on Monday to Friday 9:30AM to 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hassan Kizou can be reached on 571 272 3088. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

HM

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